

DETAILED ACTION

This Office action is in response to the Amendment filed 22 January 2008. Claims 1-31 are pending in this application. Claims 1-12 and 27-31 have been withdrawn from consideration. Claims 13-23 are allowed. Claims 24-26 are herein rejected.

Drawings

One sheet of replacement drawings was received on June 15, 2006. These drawings are acceptable.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al., Patent Application Publication 2001/0032977, of record, in view of Yokokawa et al., US Patent 6,566,233, newly cited.

Abe et al. disclose a method of fabricating a buried reflective layer in silicon by a method as shown in Figure 9 which comprises: providing a first silicon substrate having

a silicon dioxide (A) layer on a surface thereof, providing a second silicon substrate 16, implanting hydrogen into the first silicon substrate to a predetermined depth (20) forming a boundary between the hydrogen-implanted silicon and the unimplanted silicon on either side thereof (paragraph [0059]), bonding the two substrates at room temperature (paragraph [0059]) and annealing the wafers at a temperature of 800-1100°C (paragraph [0050] and [0063]) to promote cleaving or fracturing (splitting, destacking) of the hydrogen implanted regions 20 and to strengthen the bond (paragraphs [0051] and [0063]), separating the silicon at the hydrogen boundary thereby exposing a separated surface and then repeating the above-identified steps, i.e., providing another silicon wafer having a silicon dioxide layer thereon, implanting hydrogen into that wafer, bonding that wafer to the exposed silicon surface and separating to expose a separated surface (paragraph [0051], [0060], and [0064]). Abe et al. lack anticipation of initially implanting hydrogen ions only into the silicon body and of performing a heating step to a cleaving temperature, as recited in lines 10-16 of claim 24.

Yokokawa et al. disclose a method of bonding two silicon substrates as shown in figure 1(A) in which hydrogen ions are implanted into a bare silicon wafer and the implanted wafer is then bonded to a second silicon wafer on which an oxide film is formed. After the bonding step, Yokokawa et al. disclose to subject the bonded substrates to a first cleaving or fracturing heating step at a temperature in the range of 400-600 °C (column 4, lines 26-39) and a second bond strengthening heating step at a temperature in the range of 1000-1350 °C (column 4, lines 40-50). The ion implantation

separation method of Yokokawa et al. in which hydrogen ions are implanted into a bare silicon wafer produces a bonded wafer with less bonding failure, see the section of the Yokokawa et al. Patent entitled Disclosure of the Invention.

Yokokawa et al. disclose a wafer bonding method which is similar to that of Abe et al. but ensures less failure of the bond between the wafers. Therefore, it would have been obvious to one skilled in the art to implement the implantation and heat treatment steps of Yokokawa et al. in the known method of Abe et al. in order to ensure that the bond between the two wafers does not fail.

Allowable Subject Matter

Claim 26 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: There is no teaching or suggestion in Abe et al. or Yokokawa et al. to form an epitaxial silicon layer on the fractured silicon.

Response to Arguments

Applicant's arguments with respect to claims 24-26 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

Claims 13-23 are allowable over the prior art of record.

Conclusion

This application contains claims 1-12 and 27-31 drawn to an invention non-elected with traverse in the Response filed December 5, 2005. Although Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, a complete reply to this rejection should include cancellation of these non-elected claims or other appropriate action (37 CFR 1.144).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. Wilczewski whose telephone number is (571) 272-1849. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/M. Wilczewski/
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